2.1 Biodiversity and Evolution – Answers

1. (a) *Lugworm* segmented body; septa; fluid filled body cavity;

hydrostatic skeleton; primitive brain and nervous systems;

thin permeable skin; closed circulatory system; (not: coelom)

(Max 2) [2]

Frog Phylum Chordata / chordate, accept vertebrate; [1]

Class Amphibia; [1]

Locust Phylum Arthropoda / arthropod; [1]

class Insecta / insect; [1]

Features of phylum

a body divided into segments

a body further divided into head, thorax and abdomen/three sections

a well developed brain

a hard outer exoskeleton (made of chitin)

(paired) jointed legs (not: ref. 6)

an open circulatory system/haemocoel

a cavity which surrounds the body organs

(Max 2) [2]

Field mushroom Kingdom fungi; [1]

(b) Schistocerca. [1]

[10 marks]

2.

One mark for each line:-

Animalia: Fungi: Protoctista: Plantae: Prokaryotae. [5]
(no mark if extra ticks present)

[Total 5 marks]

3.

(a) Wings of birds and bats. [1]

(b) (i) Adaptive radiation (**Allow** Speciation / Natural Selection) [1]

(ii) No competition from other birds / vacant niches / subsequent intraspecific competition (Any two) [2]

(c) Unable to interbreed and produce fertile offspring [1]
(allow: breed together. Not: unable to breed)

(d) DNA profiling/hybridisation (comparing DNA or equivalent e.g. fingerprinting)
(not: looking at DNA/electrophoresis unqualified) [1]

[Total 6 marks]

4.

(a) Chordata/chordates (accept vertebrata/vertebrates). 1

(b) (i) Pentadactyl (limb). 1

(ii) B. 1

(ii) Phoca. 1

(c) (i) Homologues/homologous. (not: analogous/adaptive radiation) 1

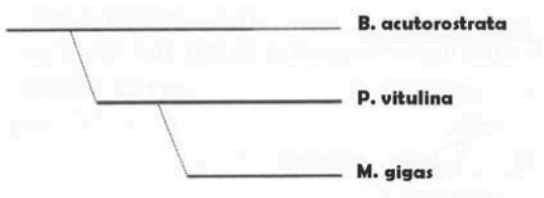
(ii) They suggest the existence of shared/common ancestors 1

(not: similar ancestors)

(d) (i) 6. 1

(ii) Macroderma gigas. 1

(e) 1



9 MARKS

5.

(a) Segmented body **[1]**
Jointed limbs **[1]**

(b) Water proof – terrestrial adaptation **[1]**
Limits growth / necessitates moulting **[1]**

(c) Class **[1]**

[Total 5 marks]

6.

(a) Chordata (allow: vertebrata) 1
Mammalia/mammals 1
Acinonyx 1

(b) Phylum: vertebral column/backbone
well developed brain/CNS enclosed in a cranium
internal skeleton 1
(any 1)

Class: endothermic (not: warm blooded)
Lungs
Hair / fur
Double circulation
Internal gestation / mammary glands /feed young on milk (allow: give birth to live young / placenta)

Sweat glands 1
(any 1)

(c) (Genetic/population) bottleneck (not: low gene pool) 1

(d) (i) Electrophoresis
Genetic/DNA fingerprinting / DNA hybridisation / DNA profiling (not: DNA analysis) / protein sequencing 1
(any 1)

(ii) That the DNA / sequence of bases/ genes/proteins shared between individuals is very high / closely match
(allow: ref. banding patterns very similar) 1

Total 8 marks

7.

(a)	(i)	Arthropoda		1
	(ii)	jointed legs	max	2
		exoskeleton		
		fluid-filled body cavity / haemocoel/ open circulatory system		
		Segmentation/ segmented body NOT large brain		
(b)	(i)	a group of organisms that can interbreed / breed with each other to produce fertile offspring		1
	(ii)	Genus		1
	(iii)	DNA base sequencing / hybridisation/ sequencing analysis/ DNA electrophoresis Not DNA analysis/ analysis alone		1
		genetic fingerprinting or profiling/		
		amino acid sequencing of proteins / differences in protein structure		
		(not: biochemical methods unqualified) NOT compare DNA/ genes		
	(iv)	high level of similarity shows that they are closely related / converse argument. Needs to relate to 2 a (iii)		1
			Question Total	**7**

8.

			Available
(a)		A species is a group of organisms that {can interbreed/ reproduce}; (under natural conditions) produce fertile offspring;	2
(b)	(i)	birds;	1
	(ii)	Borneo {1.61/ 1.62/1.6};	1
	(iii)	(Least at poles to) {greatest/ increasing} at equator;	1
(c)	(i)	X at second split from left or anywhere along that line;	1
	(ii)	Same genus(but different species)/ tells us the genus;	1
(d)	(i)	homologous;	1
	(ii)	analogous;	1
		Question 1 total	**[9]**

9.

(a)

Kingdom	Phylum	Class	Genus
Planta(e)/ plant(s);			
	Annelid(s)/ annelida		
	Vertebrate/ vertebrata/ chordate/ chordata;		
		Insect/ insecta;	

4

(b) (i) A = Fungi;
B = Protoctist(a)/ protoctists/ protists; NOT protozoa

2

(ii) A (reproduce by) spores/ hyphae/ mycelium/ chitin walls/ heterotrophic/ saprophytic/ eukaryotic;
Accept description of saprophytic

2

B membrane bound organelles present/ eukaryotic/ no tissue differentiation/ (mainly) single celled organisms/ unicellular;

Question 1 total **[8]**

10.

Characteristic	**Plant;**	**Animal;** Accept animalia	**Prokaryote;** Accept prokaryotic	**Protoctista;** NOT protozoa/ fungi
Eukaryotic	✓	✓	×	✓
Chloroplast	✓	×	×	Some species
Cell wall	✓	×	✓	Some species
Nucleus	✓	✓	×	✓

4

Question 1 total **[4]**

Essays

1.

(a) *Darwin*

A. Darwin recognised that species did change/ put forward a theory as to how they changed;

B. mutation qualified;

C. Overproduction;

D. Numbers remain constant/high mortality rate/struggle for survival;

E. Variation e.g. beak size or shape/rats/moths;

F. competition (for limited food source);

G. Individuals with a beneficial variation survive / survival of fittest or converse;

H. pass on beneficial characteristic;

I. Repeats generation after generation; (not: over a long time)

J. details of beak adaptation, seed, insects, fruit etc;

K. Natural selection;

L. adaptive radiation qual;

M. morphologically similar and to mainland form/common ancestor;

N. similarities of proteins/enzymes;

O. similarities of DNA/genes;

P.+ Q AVP x2 e.g. Fossil evidence, living intermediate forms, pentadactyl limb;

(Any 10)

2.

A = Prokaryotes are unicellular organisms;

B = No cellulose cell wall / Murein;

C = No membrane bound internal structures / organelles / no nuclear membrane;

D = Protoctista possess membrane bound organelles;

E = No tissue differentiation;

F = Fungi consist of hyphae / mycelium;

G = Cell wall of chitin;

H = Reproduction is by spores;

I = Plants carry out photosynthesis/ autotrophic;

J = Possess chloroplasts / membrane bound organelles;

K = Cellulose cell walls;

L = Animals are heterotrophic;

M = Show nervous co-ordination;

N = cells lack a cell wall;

O = Names of five Kingdoms;

Question total 10